

What Is Claimed Is:

1. A surgical fastener comprising:
a solid shaft of substantially uniform diameter
5 having a distal end and a proximal end;
a bar at said proximal end of said shaft, said bar
extending outwardly from said shaft;
said distal end of said shaft being rounded and
devoid of a cutting edge and devoid of a penetration
10 point; and
a fin extending outwardly from said shaft
proximate said distal end, said fin having a distal
edge inclined outwardly and proximally from said shaft
and a proximal edge inclined outwardly and proximally
15 from said shaft.
2. The fastener in accordance with claim 1
wherein the sidewise thickness of said bar is no more
than the diameter of said shaft.
- 20 3. The fastener in accordance with claim 2
wherein said fin includes two parallel sides extending
axially of said shaft, said fin being in alignment with
said bar.
- 25 4. The fastener in accordance with claim 3
wherein the thickness of said fin between said sides of
said fin is no greater than said sidewise thickness of
said bar.
- 30 5. The fastener in accordance with claim 1
wherein said fin is in alignment with said bar.

6. The fastener in accordance with claim 5 wherein a side of said shaft opposite from a side on which are disposed said bar and said fin is provided with a pair of nibs in alignment with each other axially of said shaft.

7. The fastener in accordance with claim 5, further comprising a grip portion connected to said shaft by frangible tabs, said tabs extending from a side of said shaft opposite from a side on which are disposed said bar and said fin, a portion of said tabs, upon said tabs being severed to separate said grip portion from said shaft, remaining on said shaft to provide a pair of nibs in alignment with each other axially of said shaft along said opposite side of said shaft.

8. The fastener in accordance with claim 4 wherein a side of said shaft opposite from a side on which are disposed said bar and said fin is provided with a plurality of nibs in alignment axially of said shaft.

9. The fastener in accordance with claim 4, further comprising a grip portion connected to said shaft by frangible tabs extending from a side of said shaft opposite from a side on which are disposed said bar and said fin, a portion of said tabs, upon said tabs being severed to separate said grip portion from said shaft, remaining on said shaft to provide nibs in alignment with each other axially of said shaft along said opposite side of said shaft.

10. The fastener in accordance with claim 1,
further comprising a second fin disposed on said shaft
proximally of and in alignment with said fin disposed
proximate said distal end, said second fin having side
5 walls in alignment with said sides of said fin
proximate said distal end.

11. The fastener in accordance with claim 1
wherein said bar leans distally relative to said shaft.

12. The fastener in accordance with claim 1
wherein said bar includes a first portion extending in
a first direction radially outwardly from said shaft
and a second portion extending in an opposite second
15 direction radially outwardly from said shaft, said fin
extending outwardly from only one side of said shaft
and being aligned with said first bar portion.

13. The fastener in accordance with claim 12
wherein said shaft includes a first proximal shaft
portion contiguous to and centered between said bar
first and second portions, a second distal shaft
portion from which extends said fin, and a third shaft
portion interconnecting said first and second shaft
25 portions and off-setting said first and second shaft
portions such that a side of said second shaft portion
opposite from said one side is in the same plane as an
end of said bar second portion.

14. The fastener in accordance with claim 1
wherein said bar includes a portion which extends
distally and generally parallel to said shaft.

15. The fastener in accordance with claim 1,
further comprising:

a second solid shaft of substantially uniform
diameter having a distal end and a proximal end;

5 said bar extending to, and being fixed to, said
second shaft at said proximal end of said second shaft;

said distal end of said second shaft being rounded
and devoid of a cutting edge and devoid of a
penetration point; and

10 a second fin extending outwardly from said second
shaft proximate said distal end of said second shaft,
said second fin having a distal edge inclined outwardly
and proximally from said second shaft and a proximal
edge inclined outwardly and proximally from said second
shaft;

15 said diameters of said shafts being substantially
equal to each other.

16. The fastener in accordance with claim 15
20 wherein said fins are substantially parallel to each
other.

17. The fastener in accordance with claim 15
25 wherein said fins are opposed to each other.

18. The fastener in accordance with claim 15
wherein a portion of said bar at said proximal end of a
first of said shafts is in alignment with said fin
extending from said first shaft, and a portion of said
30 bar at said proximal end of said second shaft is in
alignment with said second fin.

19. A surgical fastener comprising:

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a solid shaft of substantially uniform diameter having a distal end and a proximal end;

a ball at said proximal end of said shaft, said ball extending radially outwardly from said shaft equally around said shaft;

said distal end of said shaft being rounded and devoid of a cutting edge and devoid of a penetration point; and

a fin extending outwardly from said shaft proximate said distal end, said fin having a distal edge inclined outwardly and proximally from said shaft and a proximal edge inclined outwardly and proximally from said shaft and intersecting said fin distal edge.

20. The fastener in accordance with claim 19 wherein said fin is provided with flat parallel sides extending axially of said shaft, said fin having a thickness no greater than the diameter of said shaft.

21. A dispenser for a surgical fastener, the fastener being adapted for engagement with an installation tool carrier portion, said dispenser comprising a storage compartment for retaining the fastener, said storage compartment being provided with an opening through which said fastener is movable, wall structure extending from said storage compartment opening to an opening in a dispenser side wall and configured to guide a distal end of said installation tool with said carrier portion therein to said storage compartment, the remainder of said installation tool remaining outside of said dispenser, whereby said fastener may be engaged by said carrier portion of said installation tool and withdrawn from said dispenser by

withdrawal of said installation tool distal end from said dispenser opening.

22. A dispenser for a fastener comprising a
 5 shaft, a bar at a proximal end of said shaft extending
 outwardly from said shaft, and a fin extending
 outwardly from said shaft proximate a distal end of
 said shaft, said fin and said bar being in alignment
 with each other along a side of said shaft, and a grip
 10 portion connected to said shaft by tabs joined to an
 opposite side of said shaft, said dispenser comprising:

a housing having disposed therein a chamber for
 retaining said fastener, and an entry way for receiving
 an installation tool having a carrier portion thereon
 15 adapted to receive and retain said fastener, said
 carrier portion having cutting means thereon;

said entry way and chamber being configured to
 guide said installation tool carrier portion cutting
 means into cutting engagement with said fastener legs
 20 to sever said grip portion from said shaft, and to
 facilitate said carrier portion sliding around and into
 engagement with said fastener;

whereby upon withdrawal of said installation tool
 from said housing, said fastener, less said grip
 25 portion, is removed from said dispenser and is disposed
 in said installation tool carrier portion.

23. A dispenser for a fastener comprising a shaft
 portion and a grip portion interconnected by integral
 30 tabs, said dispenser comprising:

a housing having a chamber therein for holding
 said fastener, said chamber including a first chamber
 portion for holding said fastener shaft portion and a
 second chamber portion for holding said grip portion,

and having an entry way therein for guiding an installation tool into said first chamber portion to surround said fastener shaft portion and for guiding a cutting edge portion of said installation tool into
 5 seriatim engagement with said tabs to sever said tabs to disconnect said fastener shaft portion from said grip fastener portion, to permit withdrawal of said shaft portion from said dispenser while leaving said grip portion in said dispenser.

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24. An installation tool for a fastener comprising a shaft, a bar at a proximal end of said shaft extending outwardly from said shaft, and a fin extending outwardly from said shaft proximate a distal
 15 end of said shaft, said fin and said bar being in alignment with each other along a side of said shaft, said installation tool comprising:

an elongated inserter comprising a carrier portion adapted to retain said fastener and having at a distal
 20 end thereof a sharpened edge, said carrier portion having an open side from which extend end portions of said bar and said fin.

25. An installation tool for a fastener comprising a shaft, a bar at a proximal end of said shaft extending outwardly from said shaft, and a fin extending outwardly from said shaft proximate a distal
 25 end of said shaft, said fin and said bar being in alignment with each other along a side of said shaft, said installation tool comprising:

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an elongated rigid tube;

a carrier portion movable between a first position in said tube and a second position extended from a distal end of said tube, said carrier portion being

adapted to retain said fastener and having at a distal end thereof a sharpened edge, said carrier portion having an open side from which extend end portions of said bar and said fin; and

5 control means for moving said carrier portion in said tube between said first and second positions;

whereby said installation tool is manipulable to extend said carrier portion and said fastener therein into a body of tissue, and to withdraw said carrier
10 portion from said tissue, whereupon said fin resists withdrawal of said fastener and said fastener remains in said tissue as said installation tool is withdrawn therefrom.

15 26. The installation tool in accordance with claim 25 wherein said carrier portion comprises a chamber having an opening at said distal end defined at least in part by said sharpened edge, said open side, a closed side opposite from said open side and adapted to
20 receive a side of said shaft opposite from said side of said shaft on which are mounted said fin and said bar, and a proximal wall for engagement with said proximal end of said shaft.

25 27. A surgical fastening system comprising a fastener and an installation tool,
said fastener comprising:
a shaft;
a bar extending radially outwardly from a
30 proximal end of said shaft;
a fin extending radially outwardly from said shaft proximate a distal end of said shaft, said bar and said fin being in alignment with each other along a side of said shaft; and

said installation tool comprising:

an elongated inserter comprising a carrier portion adapted to retain said fastener and having at a distal end thereof a sharpened edge, said carrier portion having an open side from which extend end portions of said bar and said fin.

28. A surgical fastening system comprising a fastener, a dispenser for housing at least one of said fasteners, and an installation tool;

said fastener comprising:

a shaft;

a bar extending radially outwardly from a proximal end of said shaft;

a fin extending radially outwardly from said shaft proximate a distal end of said shaft, said bar and said fin being in alignment with each other along a side of said shaft;

said dispenser comprising:

a housing having disposed therein a chamber for retaining said fastener, and an entry way for receiving an installation tool having a carrier portion thereon adapted to receive and retain said fastener;

said entry way and chamber being configured so as to facilitate said carrier portion sliding into engagement with said fastener;

whereby upon withdrawal of said installation tool from said housing, said fastener is removed from said dispenser and is disposed in said installation tool carrier portion; and

said installation tool comprising:

an elongated rigid tube;

said carrier portion being movable between a first position in said tube and a second position

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said distal end of said shaft being rounded and devoid of a cutting edge and devoid of a penetration point; and

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driving said installation tool, with said fastener therein, through said first piece of tissue and into said second piece of tissue until said fastener bar engages a surface of said first piece of tissue; and

5 withdrawing said installation tool from the tissue, whereupon said fin, engaged with said second piece of tissue, resists proximal movement of said fastener, causing said installation tool to withdraw from said fastener, to leave said fastener lodged in
10 the tissue.

30. A method for attaching one piece of tissue to another piece of tissue, the method comprising the steps of:

15 providing a surgical fastener having a bar extending therefrom at a proximal end thereof, and a fin extending therefrom proximate a distal end thereof, said bar and said fin being aligned with each other;

20 providing an installation tool comprising an elongated tube having at a distal end thereof a carrier portion for releasably retaining said fastener, said carrier portion having at a distal end thereof a cutting edge and an open side portion through which extends said bar and fin of said fastener, and control
25 means for moving said carrier portion out of, and back into, said tube distal end; and

30 manipulating said installation tool and said control means thereof to project said carrier portion and said fastener into said tissue and withdraw said carrier portion from said tissue, whereupon said fin resists proximal movement of said fastener, causing said carrier portion to be withdrawn from said fastener, leaving said fastener in said tissue.

31. A method for attaching a first piece of tissue to a second piece of tissue, the method comprising the steps of:

5 providing a surgical fastener comprising:

a shaft;

a bar extending radially outwardly from a proximal end of said shaft;

10 a fin extending radially outwardly from said shaft proximate a distal end of said shaft, said bar and said fin being in alignment with each other along a side of said shaft; and

providing an installation tool comprising:

an elongated rigid tube;

15 a carrier portion movable between a first position in said tube and a second position extended from a distal end of said tube, said carrier portion being adapted to retain said fastener and having at a distal end thereof a sharpened edge, said carrier portion having an open side from which extend end portions of said bar and said fin; and

20 control means for moving said carrier portion and said fastener therein into a body of tissue, and to withdraw said carrier portion from said tissue,

25 connecting said fastener to said carrier portion of said installation tool, with said fastener fin and bar in part extending from said carrier open side, and with said distal end of said fastener disposed within said carrier portion and spaced from said edge of said carrier portion;

30 placing said distal end of said tube adjacent the first piece of tissue;

manipulating said installation tool control means to move said carrier portion distally out of said tube

and through said first piece of tissue and into said second piece of tissue until said bar engages said first piece of tissue; and

manipulating said installation tool control means
5 to move said carrier portion proximally into said tube, whereupon said fin resists withdrawal of said fastener as said carrier portion is withdrawn therefrom;

whereby to cause withdrawal of said carrier
10 portion from said fastener, to leave said fastener in the tissue.

32. A method for closing an opening in a tissue, the method comprising the steps of:

providing a surgical fastener comprising:

15 a shaft;

a bar extending radially outwardly from a proximal end of said shaft;

a fin extending radially outwardly from said shaft proximate a distal end of said shaft, said bar
20 and said fin being in alignment with each other along a side of said shaft; and

providing a dispenser for said fastener, said dispenser comprising:

a housing having disposed therein a chamber
25 for retaining said fastener, and an entry way for receiving an installation tool having a carrier portion thereon adapted to receive and retain said fastener, said carrier portion having cutting means thereon;

said entry way and chamber being configured
30 to guide said installation tool carrier portion into engagement with said fastener;

whereby upon withdrawal of said installation tool from said housing, said fastener is removed from

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said dispenser and is engaged with said installation tool carrier portion;

providing an installation tool comprising:

5 an elongated rigid tube, having at a distal end thereof a carrier portion, said carrier portion being movable between a first position in said tube and a second position extended from a distal end of said tube, said carrier portion having an open side from which extend end portions of said bar and said fin; and

10 control means for moving said carrier portion and said fastener therein into a body of tissue, and to withdraw said carrier portion from said tissue;

15 inserting said carrier portion of said installation tool into said dispenser housing chamber and withdrawing said installation tool from said dispenser with said fastener engaged with said installation tool carrier portion;

placing said distal end of said tube adjacent the tissue and proximate the opening in the tissue;

20 manipulating said installation tool control means to move said carrier portion distally out of said tube and into the tissue until said fastener bar engages said tissue; and

25 manipulating said installation tool control means to move said carrier portion proximally into said tube, whereby to cause withdrawal of said carrier portion, whereupon said fin resists withdrawal of said fastener and said fastener remains in said tissue as said installation tool is withdrawn therefrom, to leave said
30 fastener in the tissue.

33. A method for attaching a first object to a second object, the method comprising the steps of:

a solid shaft of substantially uniform diameter having a distal end and a proximal end;
a bar at said proximal end of said shaft,
5 said bar extending outwardly from said shaft;
said distal end of said shaft being rounded and devoid of a cutting edge and devoid of a penetration point; and

15 providing an installation tool for housing said fastener, said installation tool having an open distal end and an open side through which extend said bar and fin of said fastener, said distal end of said fastener being recessed from said cutting edge of said installation tool;

withdrawing said installation tool from the second
25 object and then the first object, whereupon said fin,
engaged with said second object, resists proximal
movement of said fastener, causing said installation
tool to withdraw from said fastener, to leave said
fastener lodged in both the second object and the first
30 object, with portions of the second object and first
object held between said fin and said bar so as to hold
said first object to said second object.

34. The method in accordance with claim 33 wherein said first object comprises a selected one of a group consisting of a mesh, a filament, and a piece of tissue.

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35. The method in accordance with claim 33 wherein said first object and said second object both comprise living tissue.

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36. The method in accordance with claim 35 wherein said first object and said second object both comprise meniscal cartilage.

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37. The method in accordance with claim 35 wherein said first object and said second object both comprise rotator cuff tissue.

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38. The method in accordance with claim 33 wherein said first object comprises a mesh and said second object comprises living tissue.

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